

Traumatic Aortic Injury: Still an Enigma

Eastern Radiological Society
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Thoracic & Aortic injury

OBJECTIVES

- Changing role of imaging
- Traumatic aortic injury – typical, atypical, minimal injury
- Changing role of Rx – surgery vs endotherapy

Traumatic Aortic injury

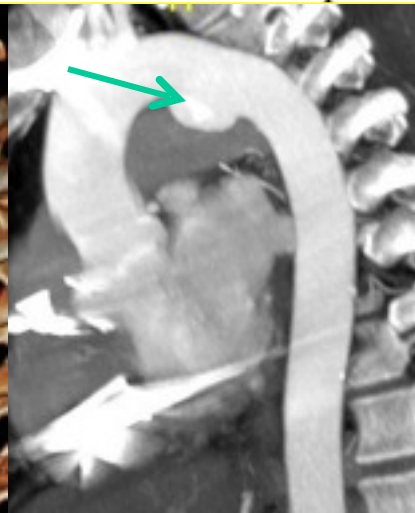
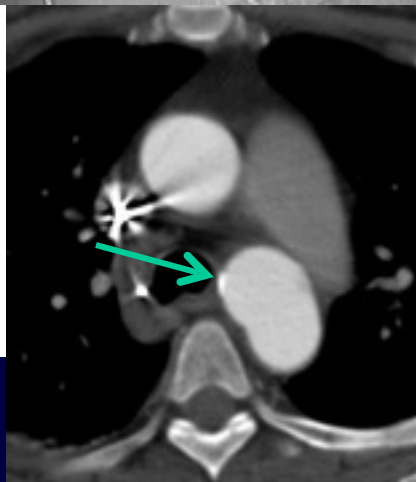
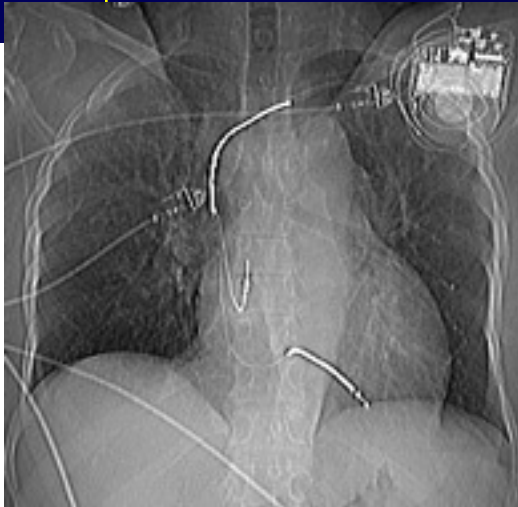
Diagnosing Traumatic Injury of the Aorta

BY, LT. COLONEL, MC, THOMAS W. MATTINGLY, BRIG. GEN., MC,
ANION, M.D., AND EDWARD J. JAHNKE, JR., MAJ., MC

of the aorta is a more common result of nonpenetrating traumatic
ly appreciated. Approximately 15 per cent of individuals with
ive temporarily. If the lesion is promptly diagnosed appropriate

difficult and at times the

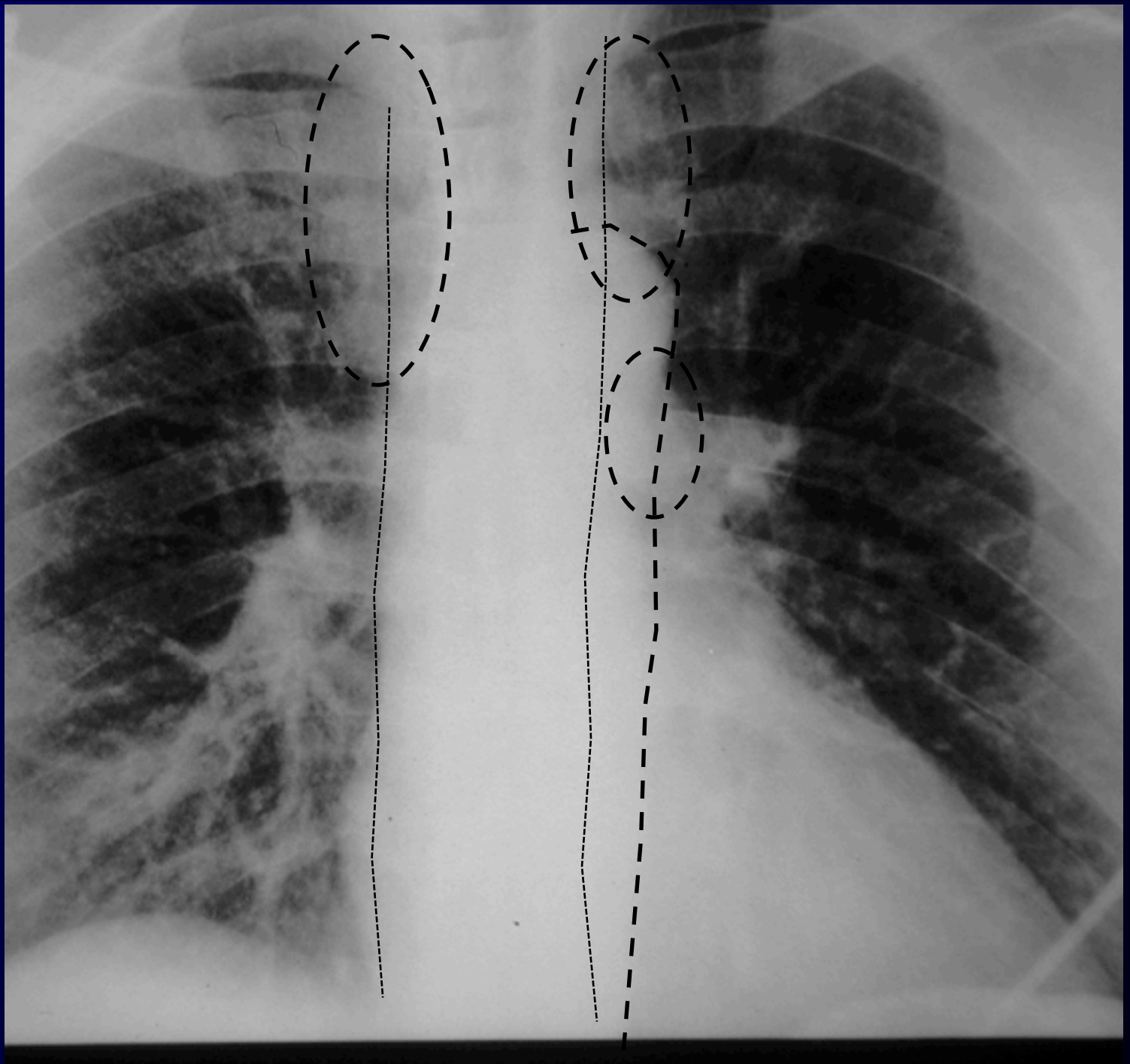
The natural course from
rupture of the aneurysm
of a false aneurysm that
ful, but in some instances



Traumatic Aortic injury

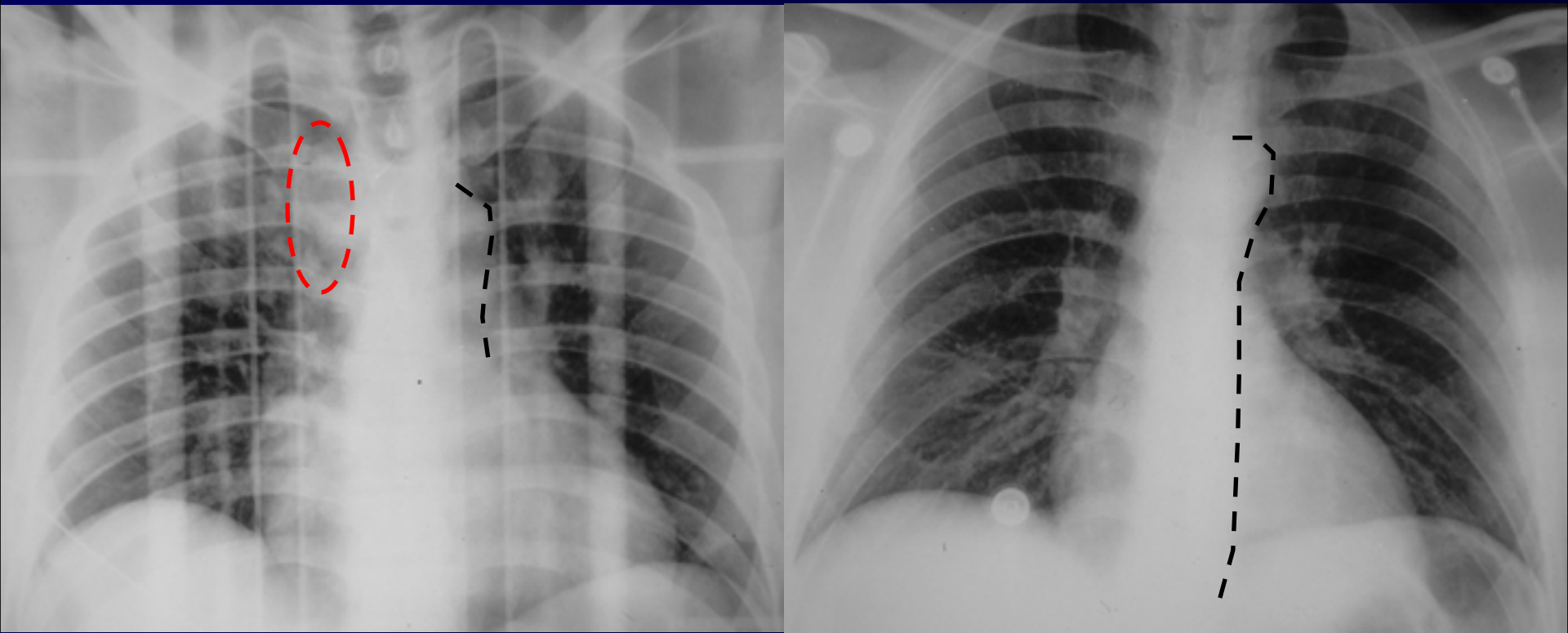
Sites of Rupture

- Isthmus 80-90%
- Ascending aorta 5-9%
- Diaphragmatic Hiatus 1-3%

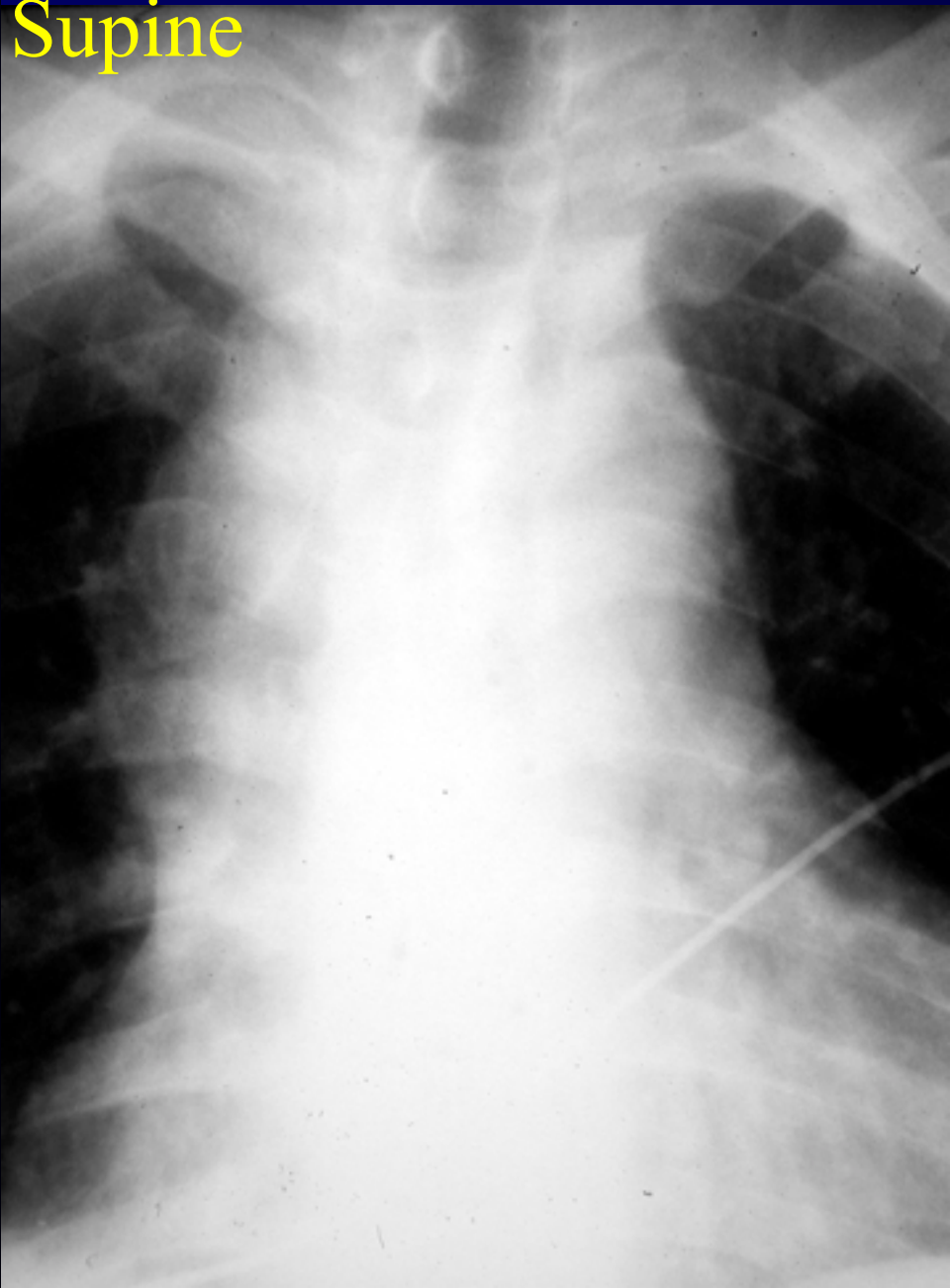


Supine

Erect

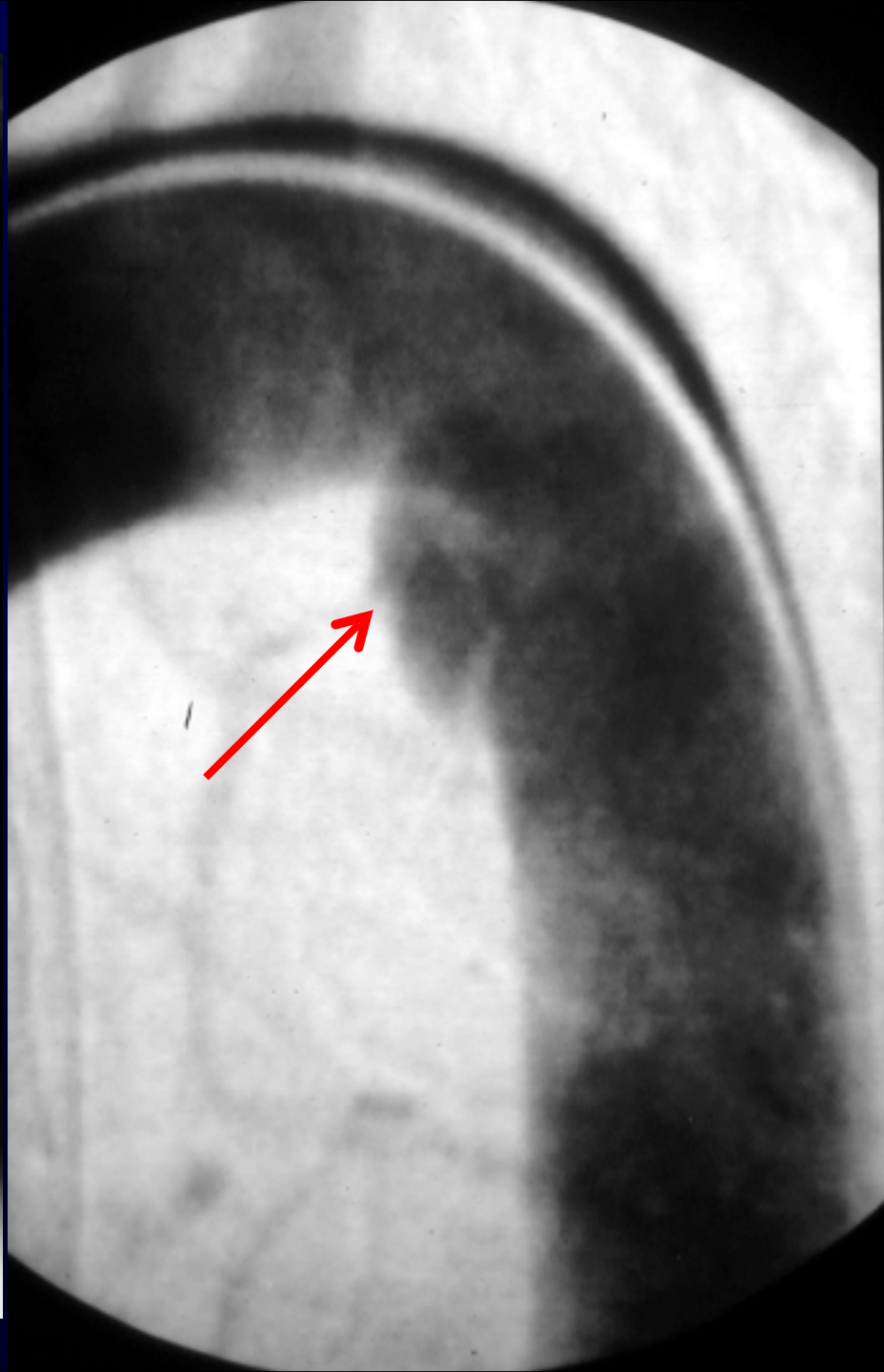
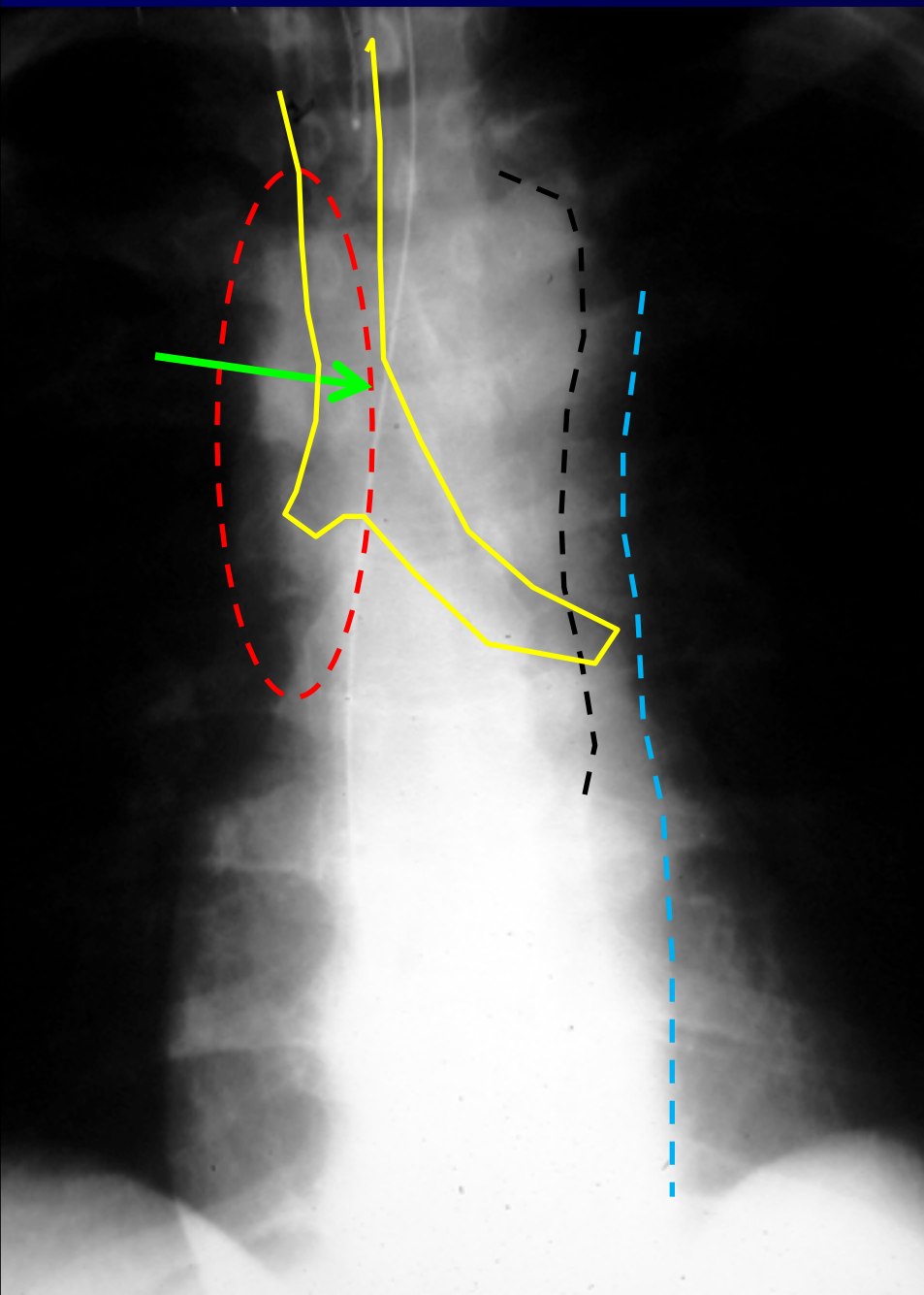


Supine



Erect





Contrast Enhanced CT

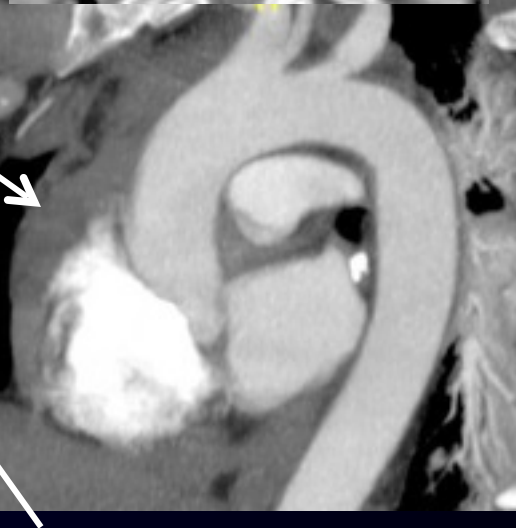
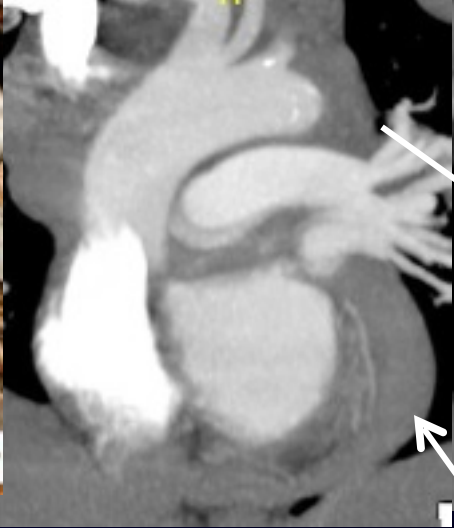
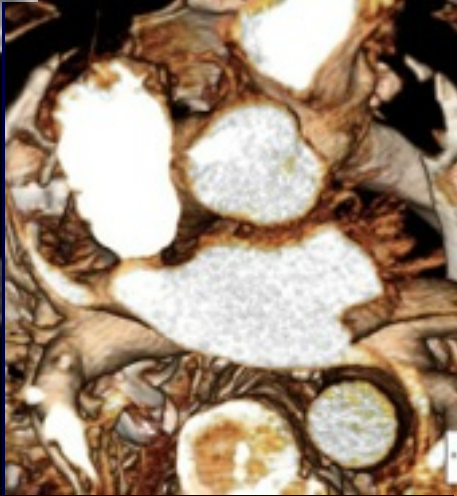
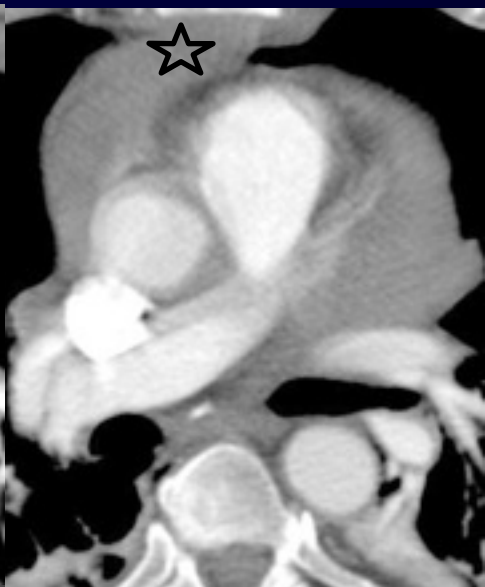
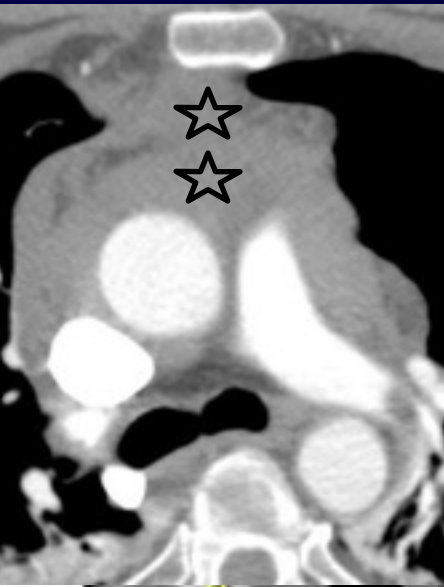
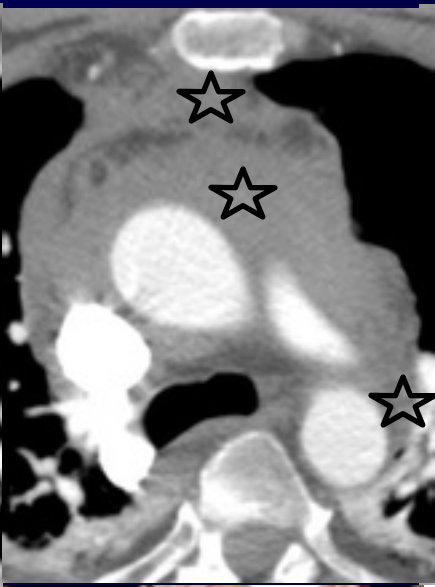
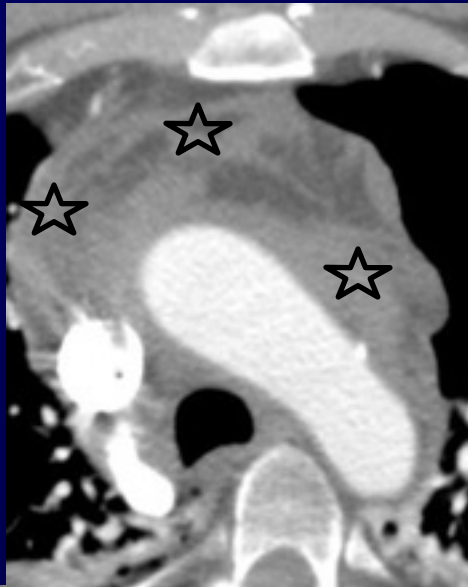
Contrast Enhanced CT

- Indirect sign
- Direct signs

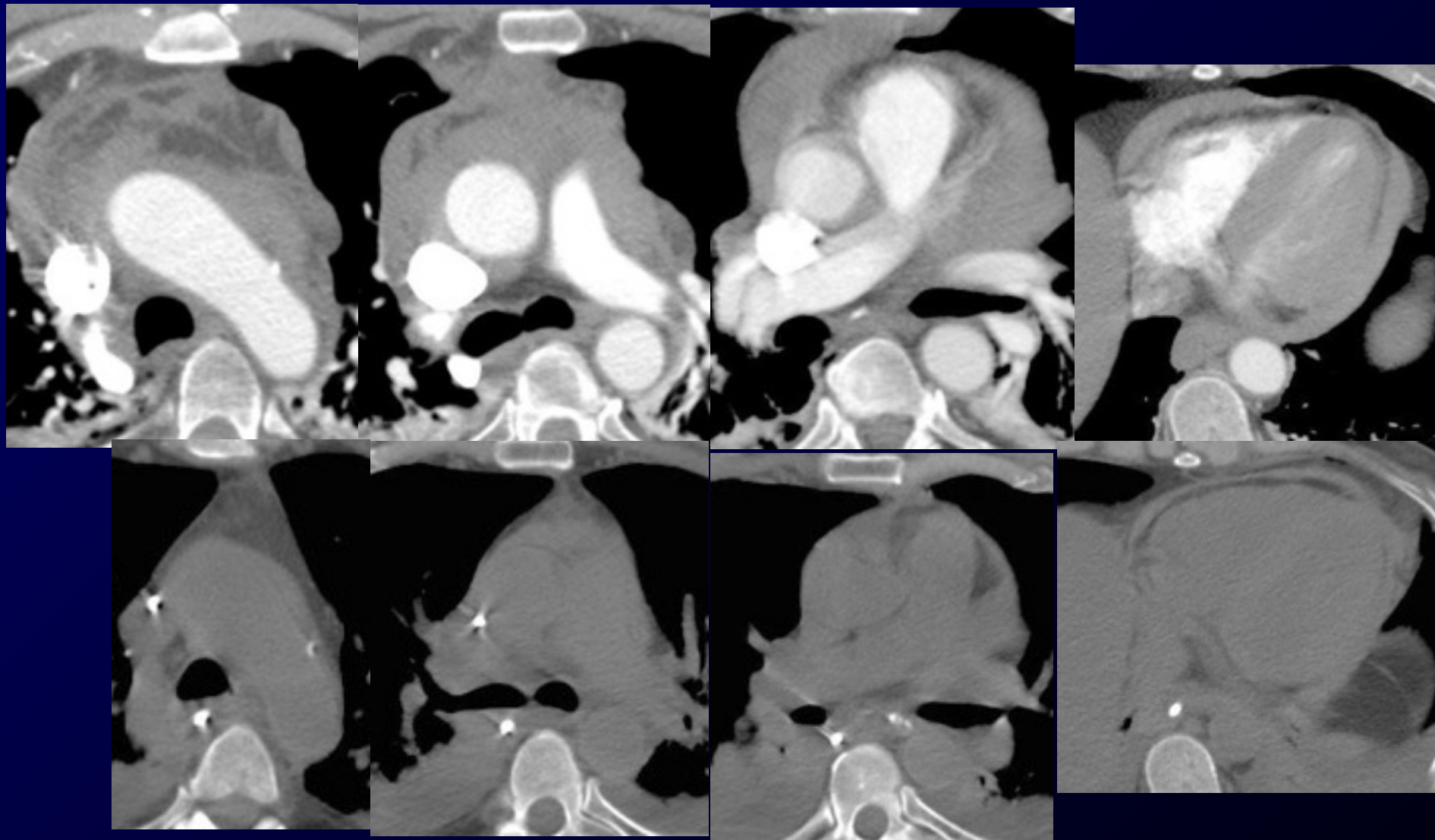
Mediastinal Hemorrhage

Indirect signs – mediastinal hemorrhage

- Anatomical location – anterior, superior, middle, posterior
- Relationship of MH – Major vessels (peri or para-aortic) / other mediastinal structures (sternum, vertebra)



Admission

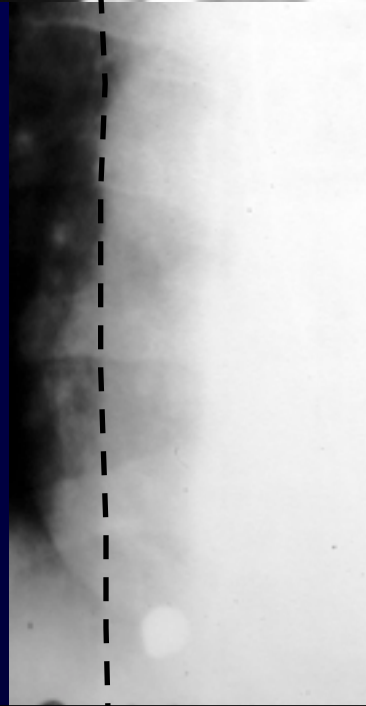
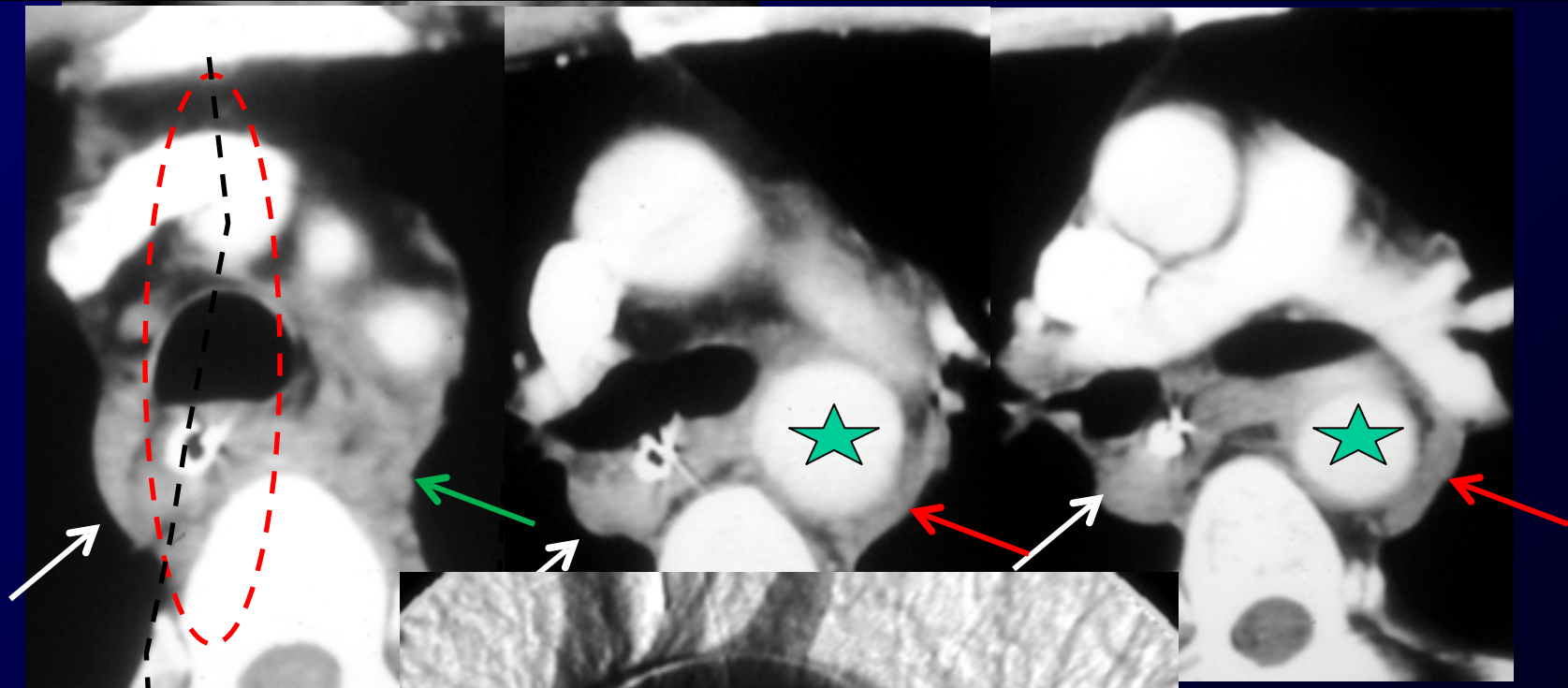


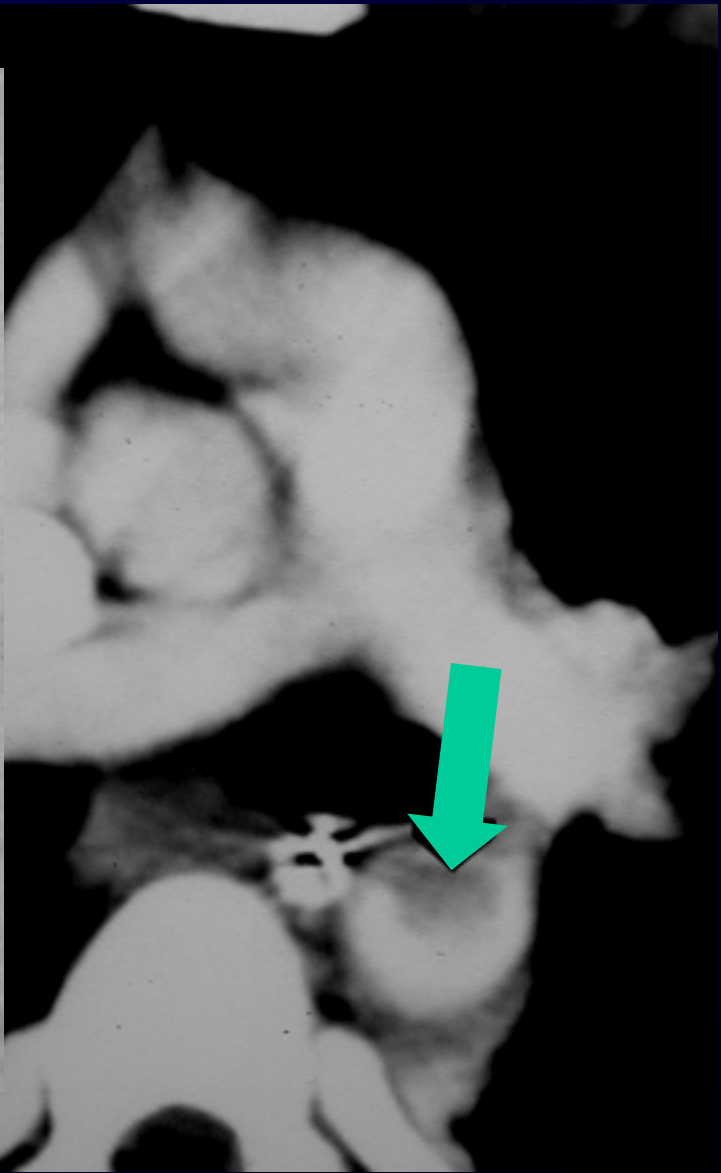
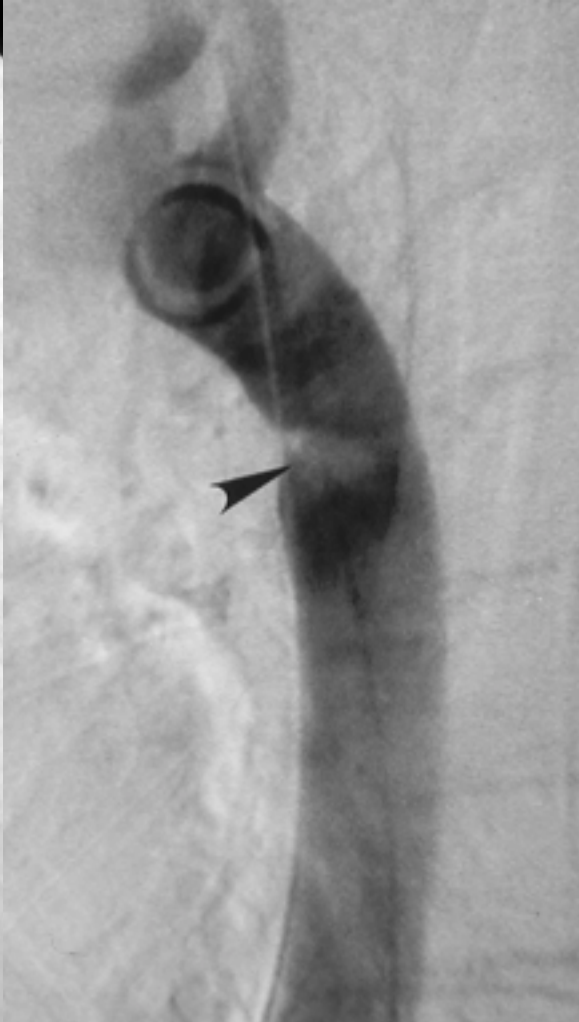
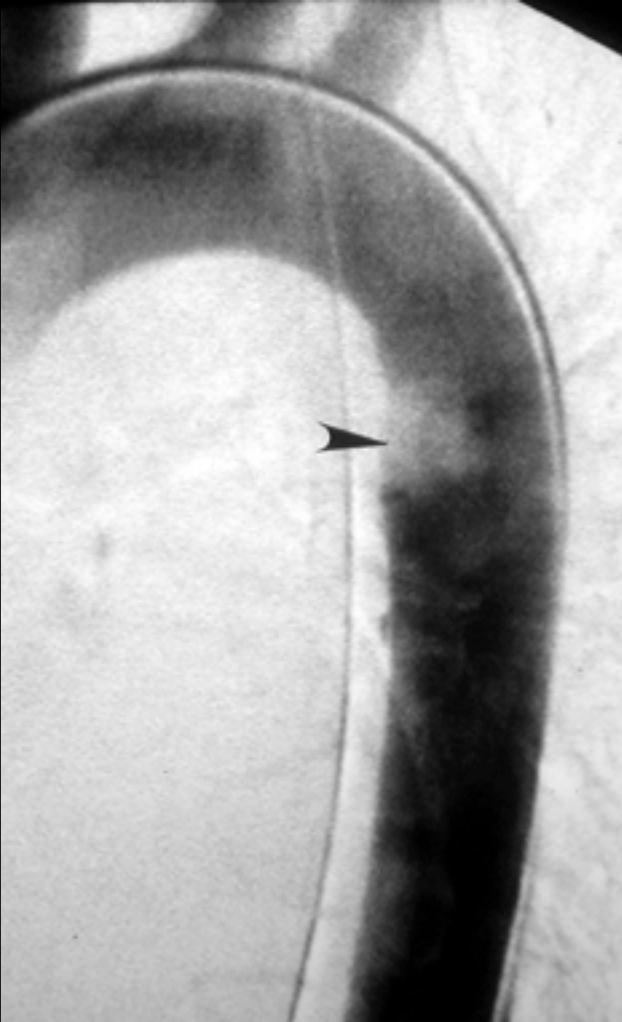
Follow-up day 3

Traumatic Aortic injury

Direct Signs

- Contour abnormality or intimal irregularity
- Intimal flap or thrombus
- Hematoma
- Pseudoaneurysm
- Active bleeding





Traumatic Aortic injury

CES- CT (n=7826)

- MH 118/1104 (10.7%)
- AORTIC INJURY 24/118 (20.3%)
- ALL CEST-CT 24/1104 (2.2%)

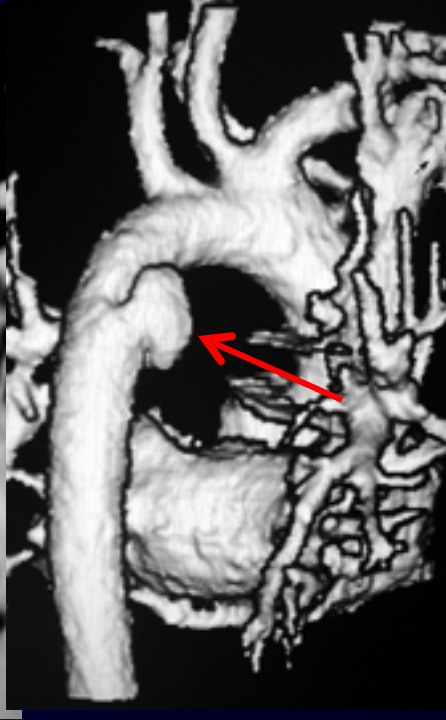
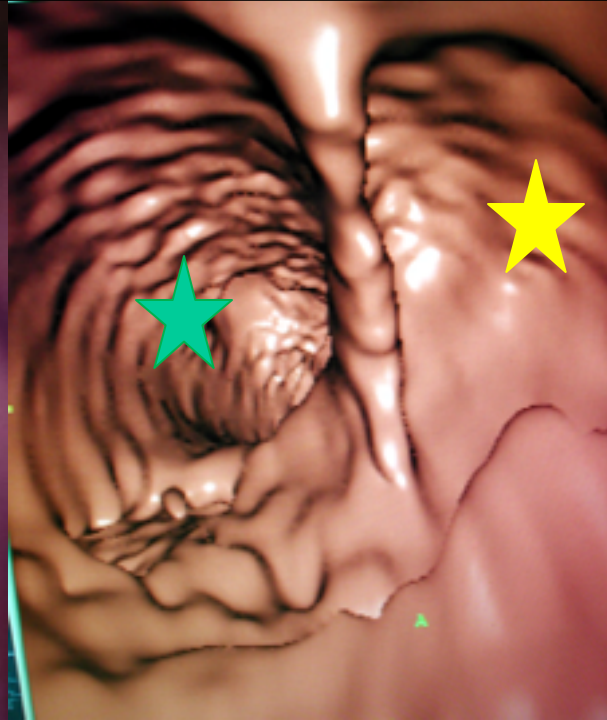
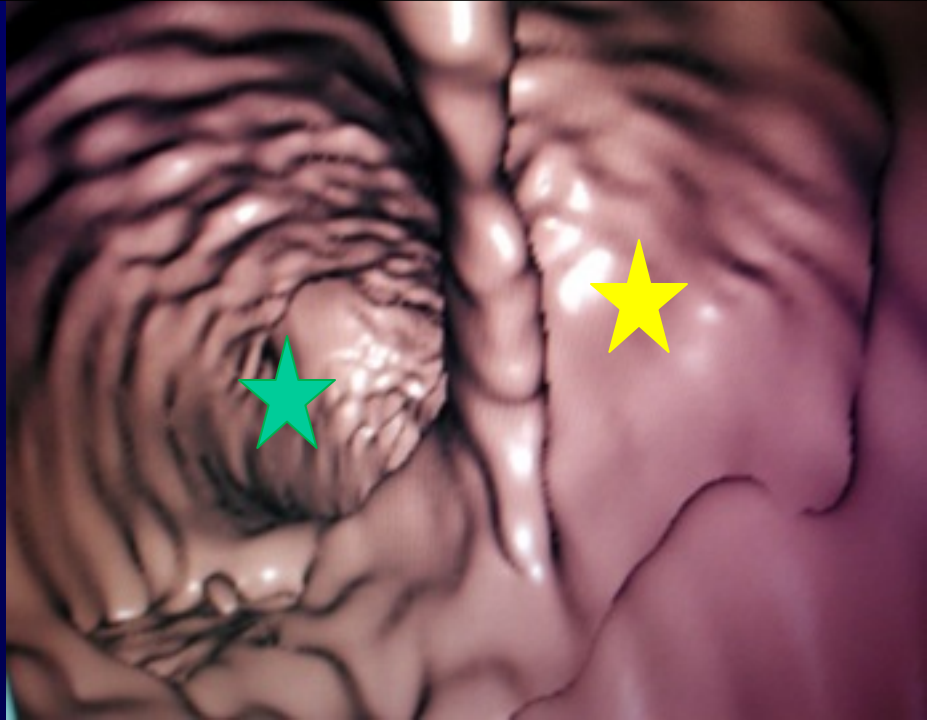
SEM, KS, JB, AR. J. TRAUMA NOV 1998

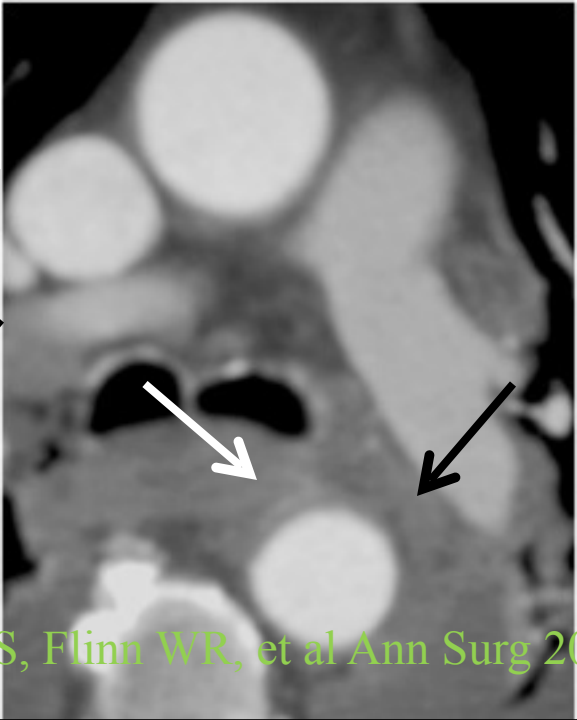
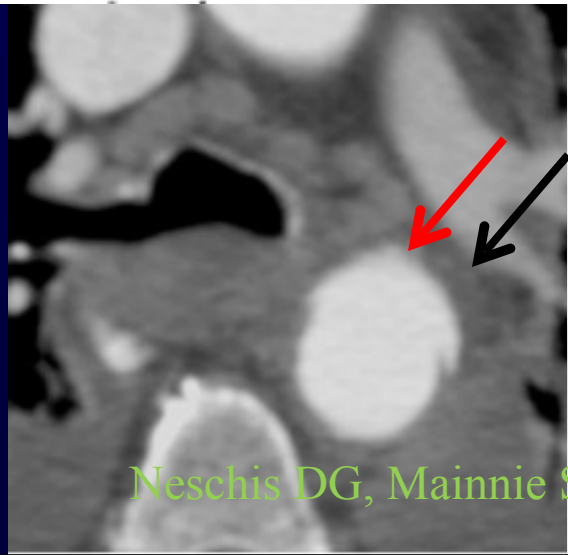
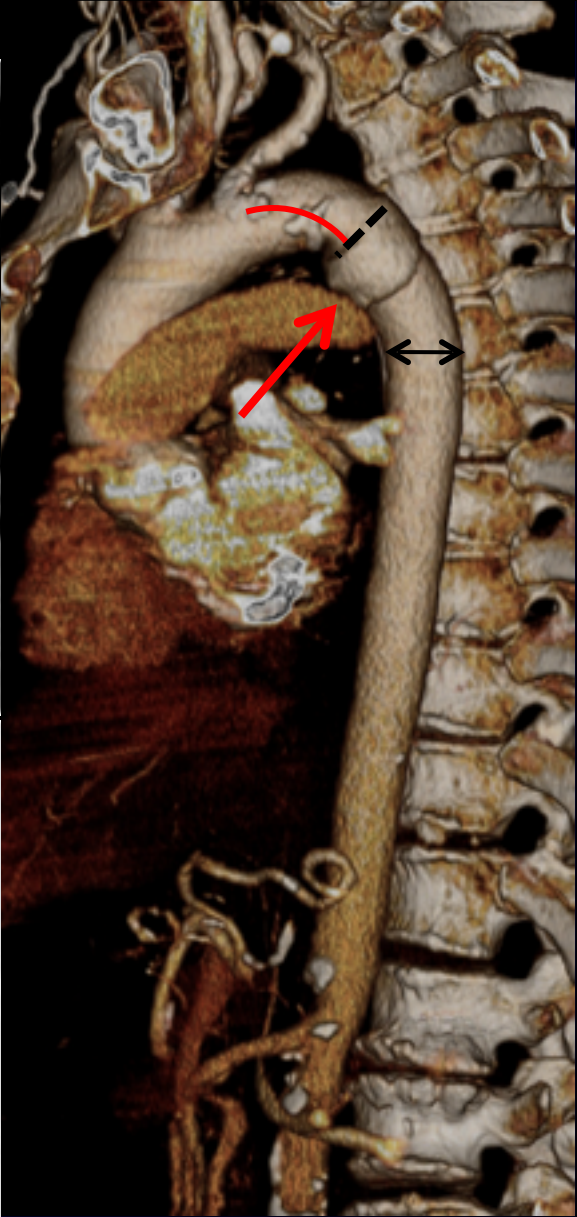
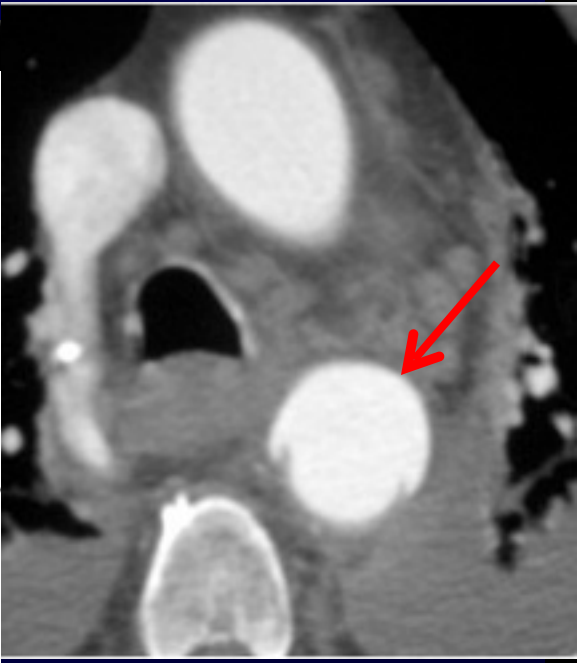
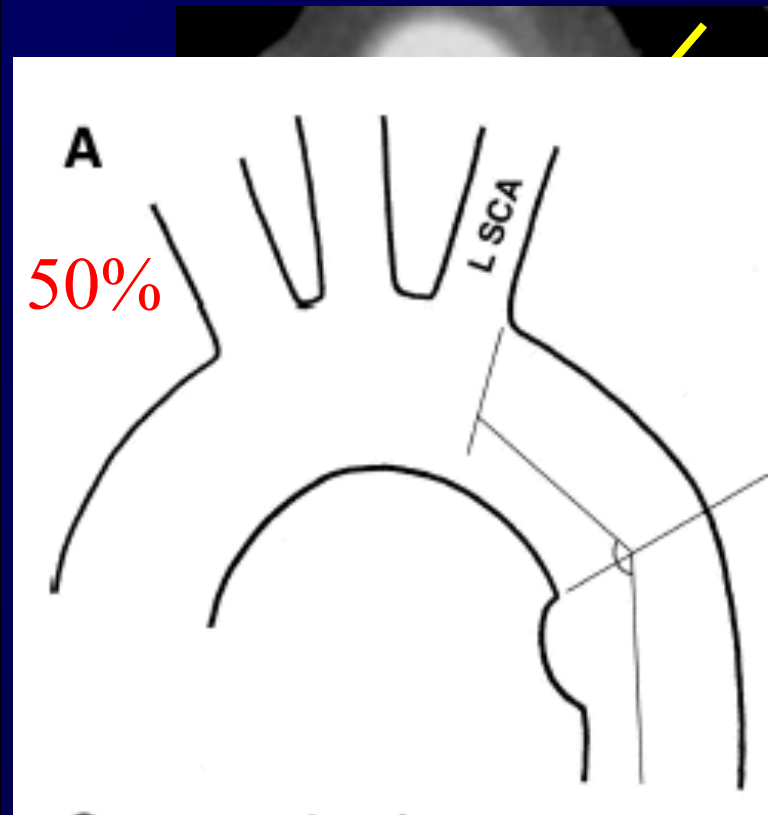
Traumatic Aortic injury

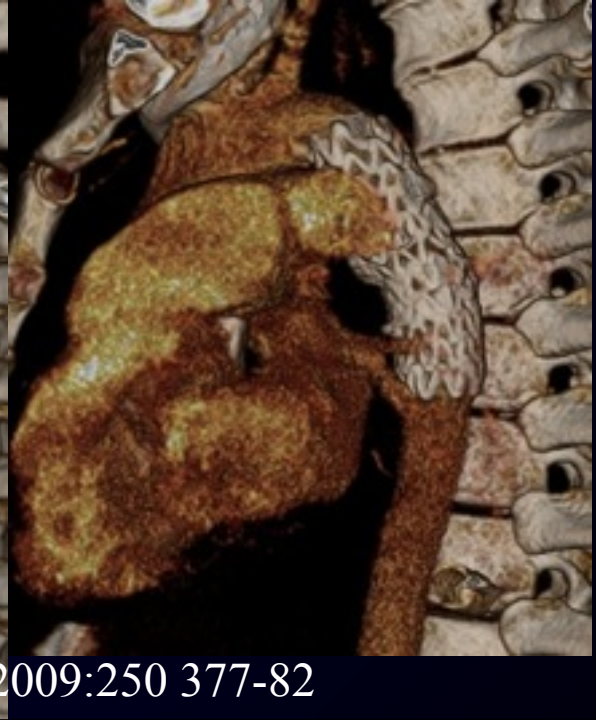
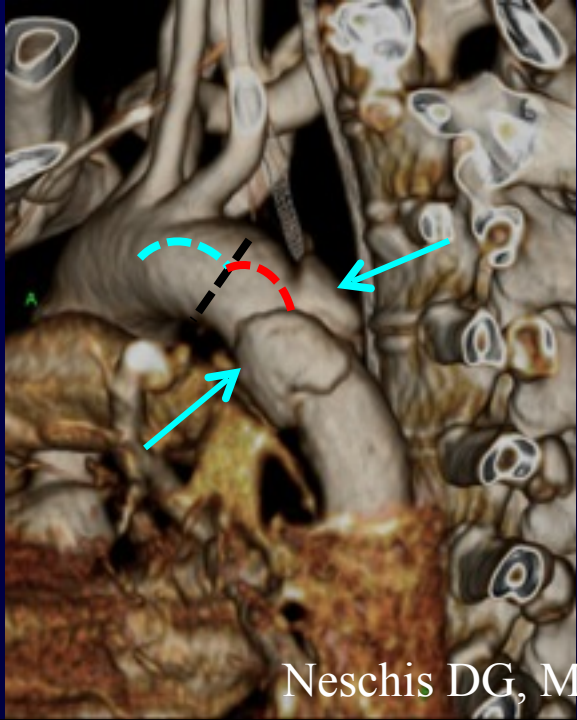
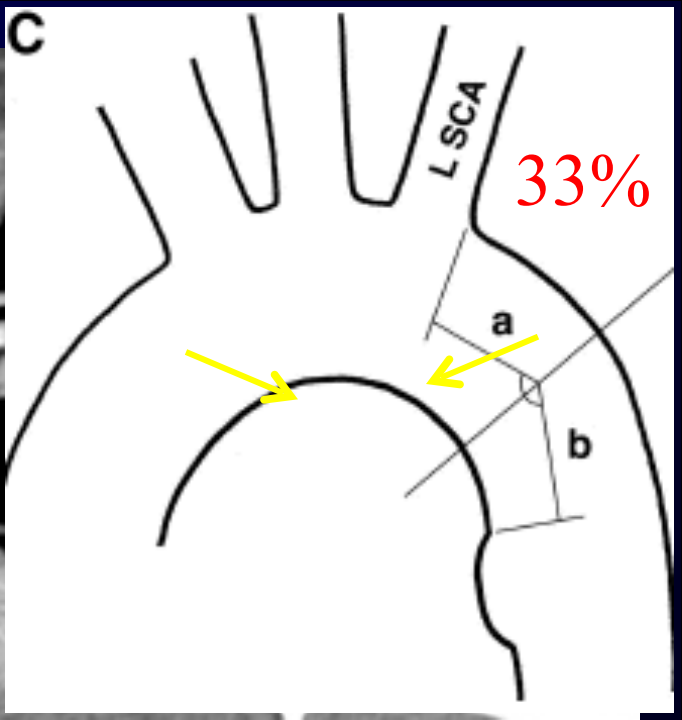
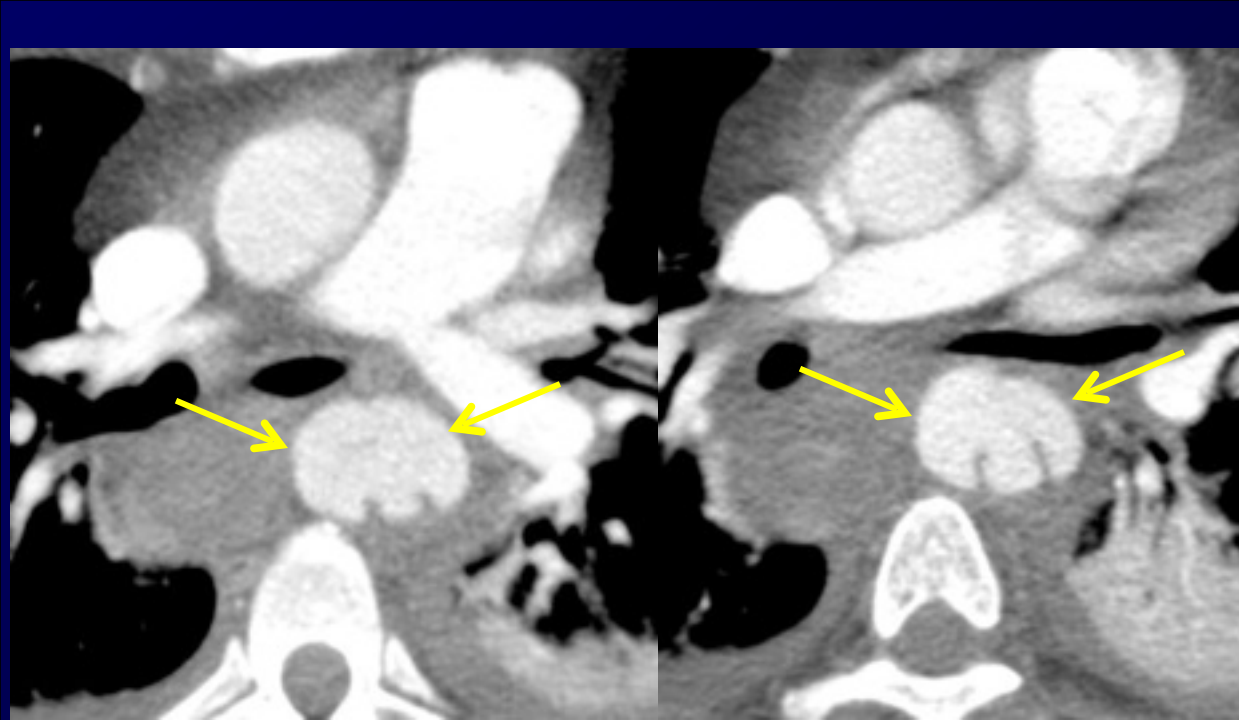
CEST- CT (n=7826)

CEST-CT. In this prospective series, CEST-CT was 100% sensitive based on clinical follow-up; it was 99.7% specific, with 89% positive and 100% negative predictive values and an over-all diagnostic accuracy of 99.7%.

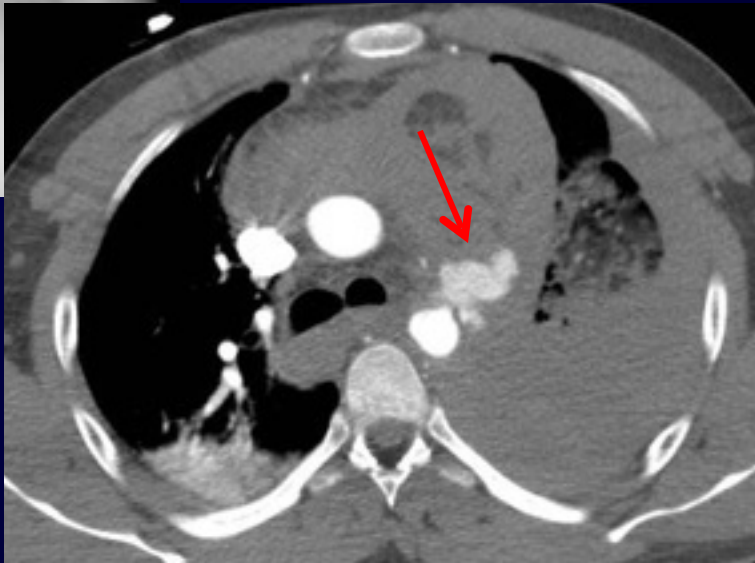
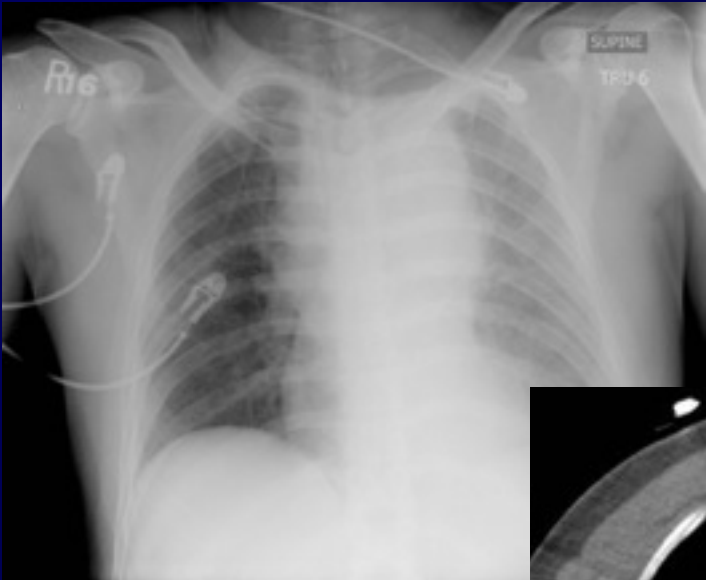
Conclusion: CEST-CT is a valuable ancillary study for the detection of traumatic aortic injury. Spiral computed tomography is accurate for the detection and localization of both hemomediastinum and direct signs of aortic injury.



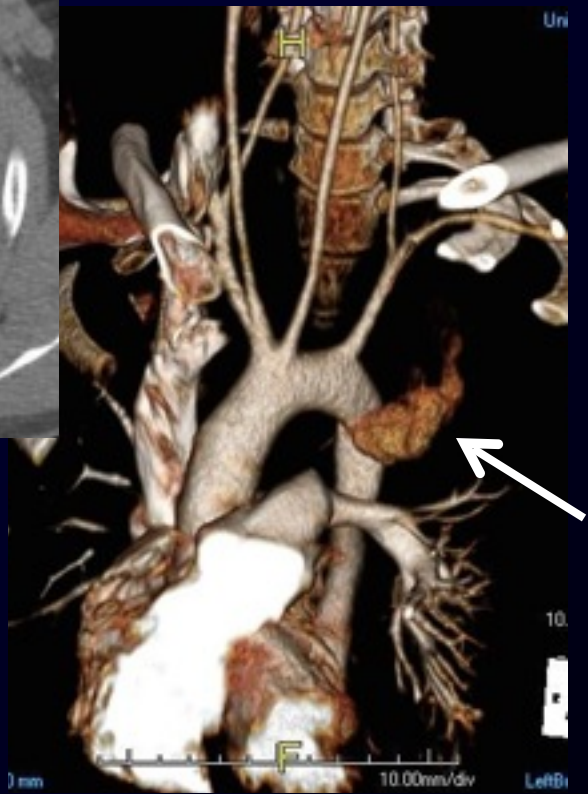




Active aortic bleed: Died in OR



Active Bleeding



Traumatic Aortic injury

CONCLUSION. Direct signs of ATAI on contrast-enhanced 64-MDCT scans do not have to be confirmed with catheter angiography. In our population, diagnostic transcatheter angiography was of limited value for clarifying equivocal or indirect MDCT findings.

Scott D. Steenburg¹
James G. Ravenel

OBJECTIVE. At some institutions, catheter angiography is used for confirmation of aortic injuries and equivocal MDCT findings. Because of the speed and efficiency of 64-MDCT,

findings needed surgical repair. The sensitivity of 64-MDCT was 96.0%; specificity, 99.8%; positive predictive value, 92.3%; negative predictive value, 99.9%; and accuracy, 99.8%.

Traumatic Aortic injury

Table 1 Diagnostic Modalities for TAI: AAST₁ vs. AAST₂

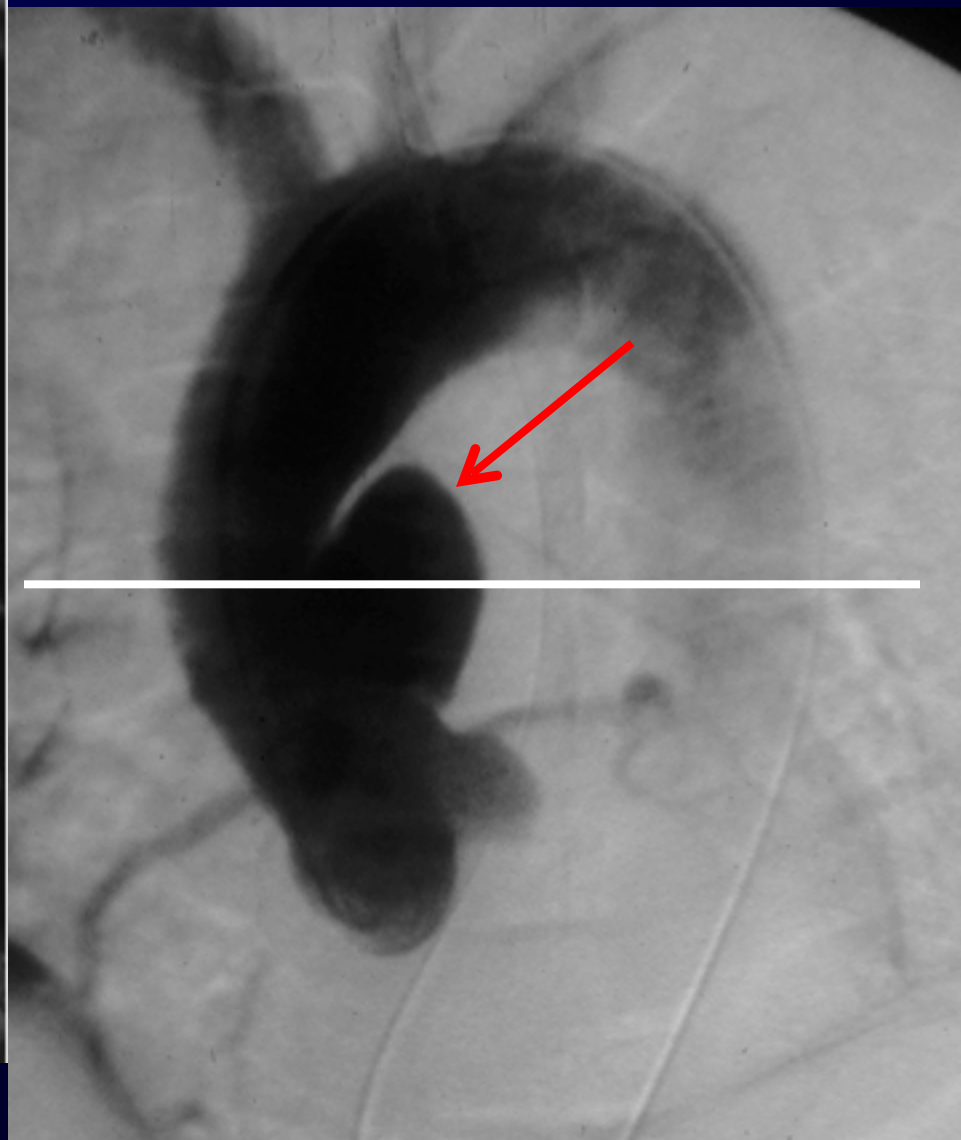
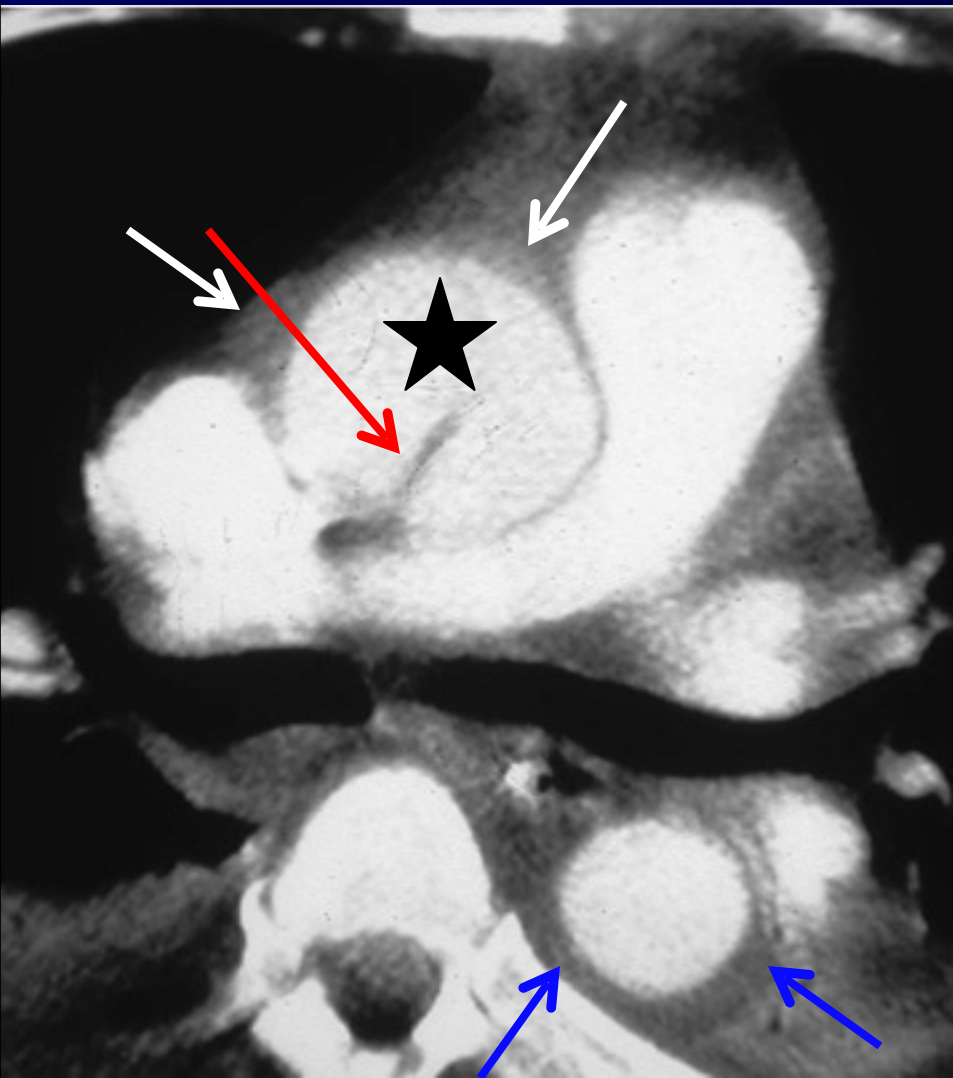
	AAST ₁ , 1998 N = 253* (%)	AAST ₂ , 2008 N = 193 (%)	p
Aortogram (n/%)	220 (87.0)	16 (8.3)	<0.001
CT scan	88 (34.8)	180 (93.3)	<0.001
TEE	20 (7.9)	2 (1.0)	<0.001

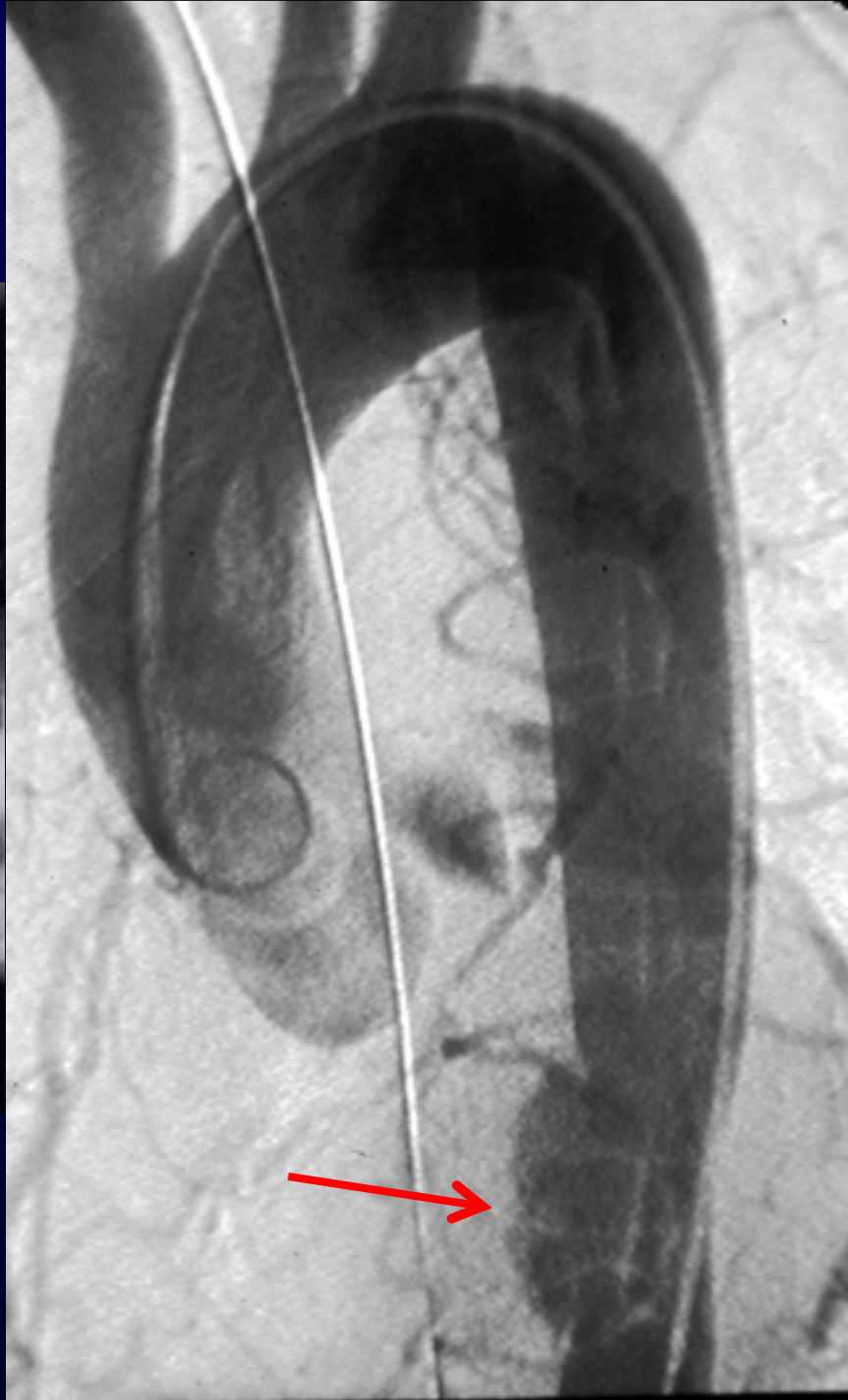
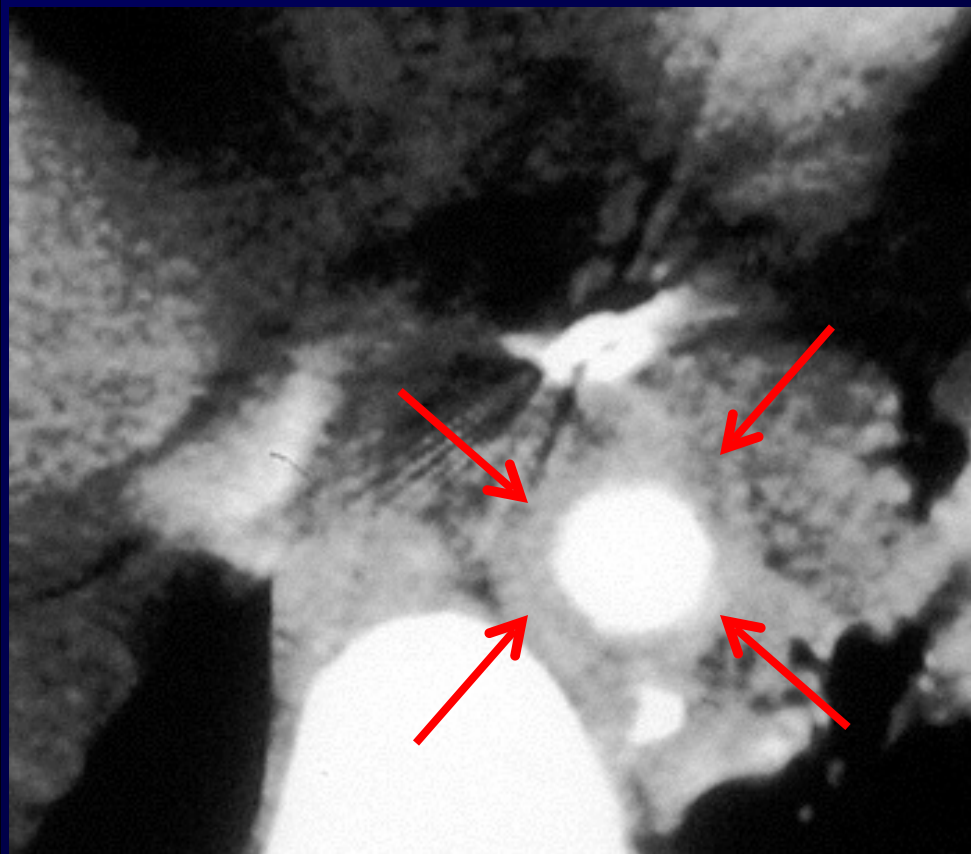
J Trauma. 2008;64:1415–1419.

* Excluding patients investigations.

198 patients with TRA from 18 centers

Atypical Traumatic Aortic Injury

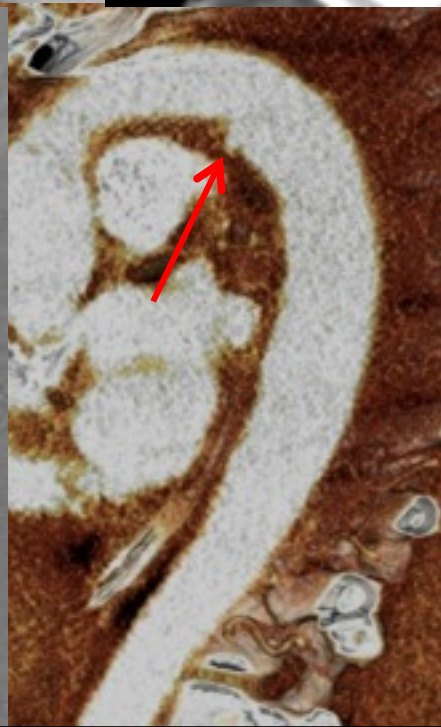
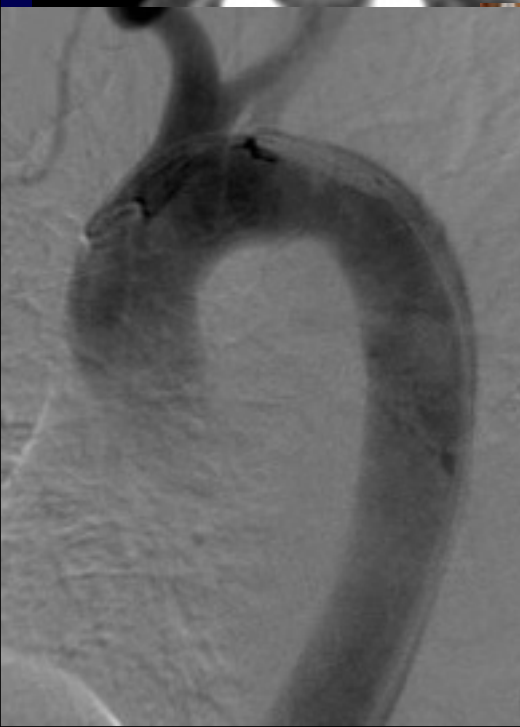
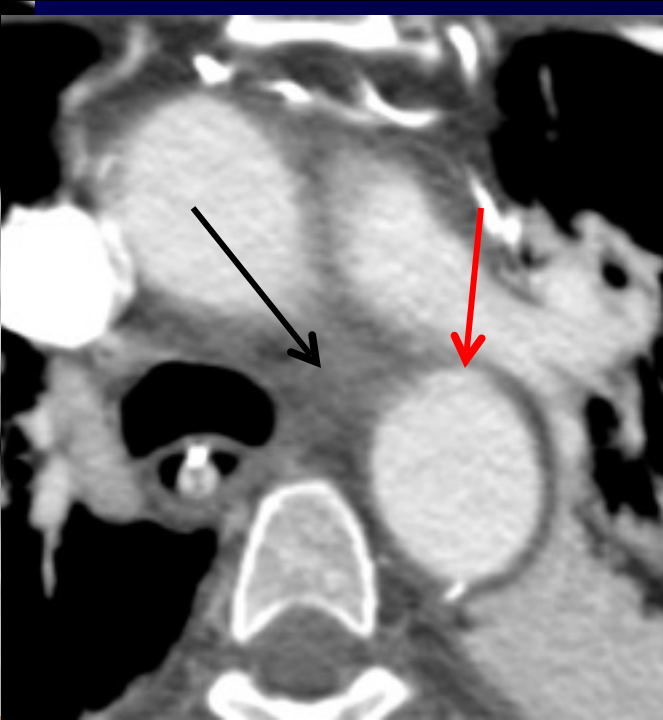


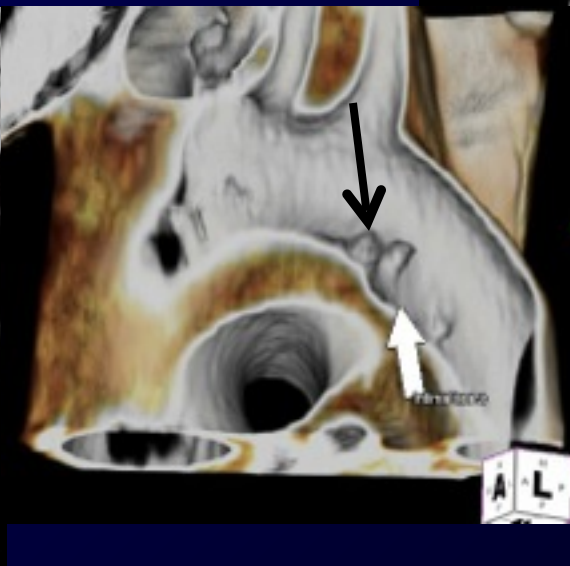
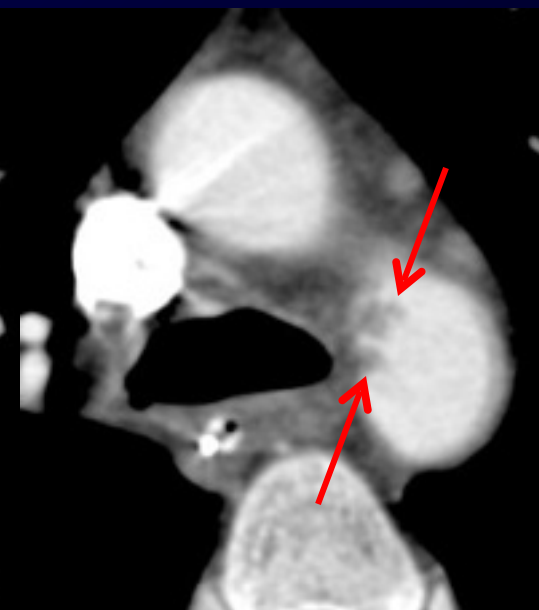
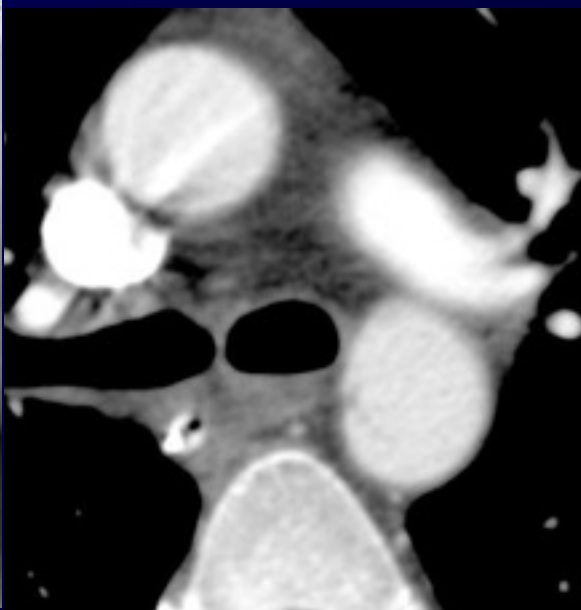
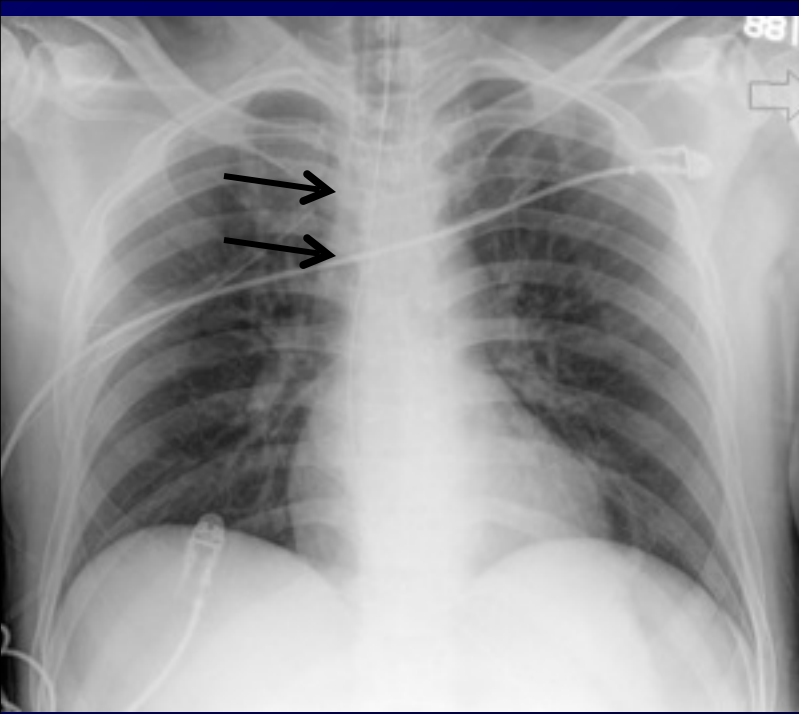


Minimal Traumatic Aortic Injury

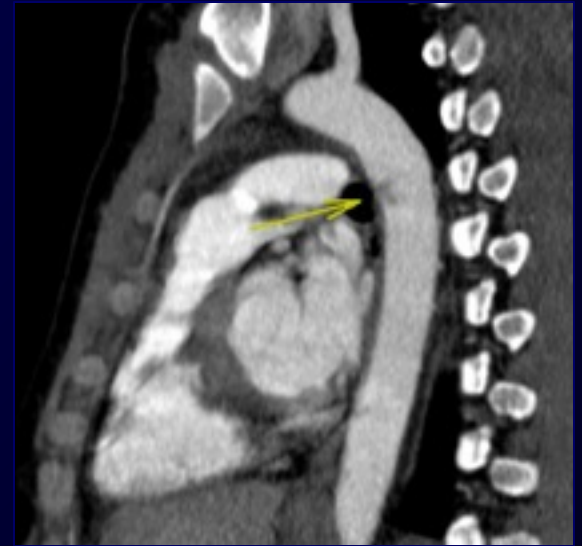
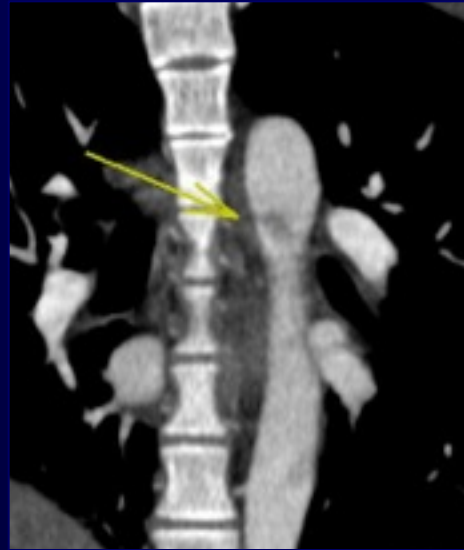
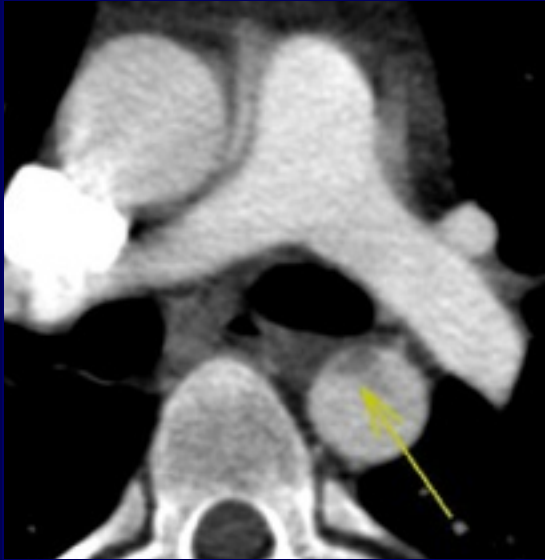
1 cm intimal flap

Pseudoaneurysm < 10% normal circumference
no or minimal mediastinal hemorrhage

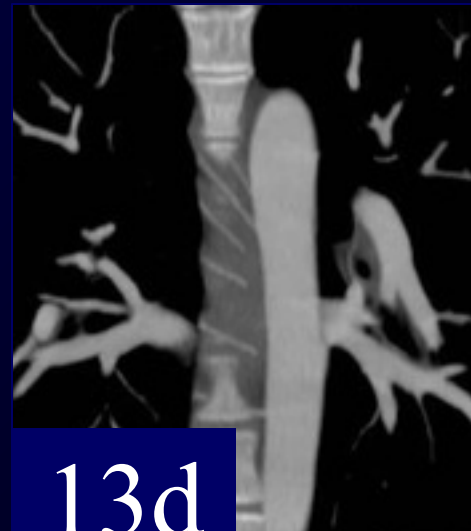
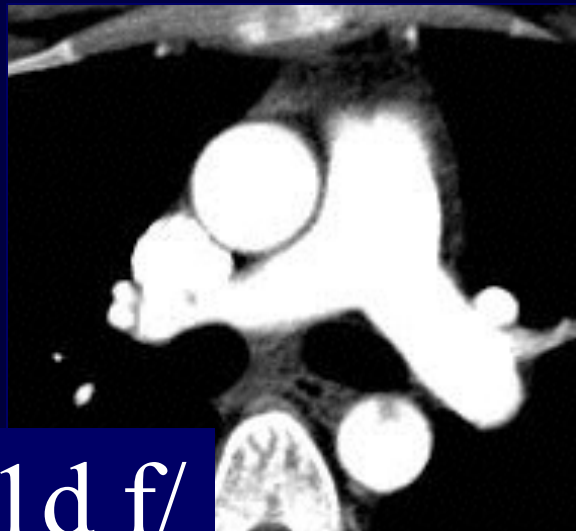




Minor intimal tear; 0 MH



Resolved – No treatment



Traumatic Aortic injury

Table 2 Methods of Definitive Repair of TAI: AAST₁ vs. AAST₂

	AAST ₁ , 1998 N = 207* (%)	AAST ₂ , 2008 N = 193 (%)	<i>p</i>
Open repair	207 (100)	68 (35.2)	<0.001
Clamp/sew	73/207 (35.3)	11/68 (16.2)	0.003
Bypass	134/207 (64.7)	57/68 (83.8)	0.003
Endovascular repair	0/207	125/193 (64.8)	<0.001

* Excluding patients in extremis or those managed nonoperatively.

198 patients with TIA from 18 centers

Traumatic Aortic injury

Endovascular vs open surgery Rx - advantages

- Reduction in overall mortality - 22%~13%
- Procedure related paraplegia - 8.7%~1.6%

Traumatic Aortic injury

Endovascular Stenting for Traumatic Aortic Injury: An Emerging New Standard of Care

Sina L. Moainie, MD, David G. Neschis, MD, James S. Gammie, MD,
James M. Brown, MD, Robert S. Poston, MD, Thomas M. Scalea, MD,
and Bartley P. Griffith, MD

Divisions of Cardiac Surgery and Vascular Surgery, and R. Adams Cowley Shock Trauma Center, University of Maryland School of Medicine, Baltimore, Maryland

- Less intra-operative blood loss
- Less incidence of post-op tracheostomy

Traumatic Aortic injury

Endovascular Repair Compared With Operative Repair of Traumatic Rupture of the Thoracic Aorta: A Nonsystematic Review and a Plea for Trauma-Specific Reporting Guidelines

Riyad Karmy-Jones, MD, Lisa Ferrigno, MD, Desarom Teso, MD, William B. Long III, MD, and Steven Shackford, MD

endoluminal = 4%)

(*J Trauma*. 2011;71: 1059–1072)

- Type I endo leak – 5.2% (majority proximal, day 1-7 months)

Traumatic Aortic injury

Endovascular Rx - complications

- Stent collapse – 2.5%
- Symptomatic subclavian steal – 2 %
- Fx or migration – 1% (3 +13)
- Access related complications – femoral, brachial, & iliac arteries

COWLEY SHOCK TRAUMA CENTER UNIVERSITY OF MARYLAND

